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REVIEWS

The Nation's Food: A Statistical Study of a Physiological and Social Problem. By Raymond Pearl, Ph.D., Sc.D., LL.D. Philadelphia and London, W. B. Saunders Company, 1920. Pp. 274.

Dr. Pearl's study of the nation's food problem "makes available for the first time a knowledge, to at least the first degree of approximation, of how much and what kinds of food the American people as a whole eat." It is a work that is extremely interesting to the student of statistical technique, and of national nutrition and dietary in connection with national food production and foreign trade. The occasion for the construction of this work was the participation of this country in the World War from the beginning, April 6, 1917, to the armistice of November 11, 1918, and the supply of food for some time thereafter to Allies and other peoples. Dr. Pearl was chief of the Statistical Division of the United States Food Administration.

In this work, materials are classified as (a) primary human foods, including plant materials, "and all animals or animal products in which the animal gets its nourishment from some source other than the primary feeds and fodders," and the primary feeds and fodders are plant materials used for the nourishment of domestic animals; and (b) secondary human foods, which include "all edible products of animals used for human food, the animals being nourished with primary feeds and fodders." The object of this classification is "to allocate the nutrient resources of the nation according to the usage made of them," and to avoid duplication.

Under each food classification as primary or secondary, the plan is to determine for each year from 1911 to 1917 (beginning July 1) the amount of the basic nutrients—protein, fat, and carbohydrate—produced, imported, and exported in the case of each item of food. Many of these items presented problems of great difficulty. Production may not have been estimated by another office of the government, as in the case of corn meal for instance, so that Dr. Pearl's division had to contrive its own procedure for estimating. Next, it was necessary to determine the quantity of each item of product used for human food. The entire potato crop, for illustration, is not so used; about 8½ per cent is used for seed, and as Dr. Pearl estimates seed and waste to be one-third, the estimated waste must be one-quarter.

The food product from which the three human nutrients of protein, fat, and carbohydrate may be derived is now multiplied by the appropriate factor to compute the production of the nutrients. These factors were chiefly those of Atwater and Bryant, but supplemental use was made of the factors of other investigators. As published, the gross nutrient source product, and the three nutrients derived from it, are expressed in metric tons; but when the three nutrients are combined, their common denominator is calories.

Step by step, the operations lead to consumption, by means of the familiar formula: production + (imports − foreign exports) − domestic exports. Trade between contiguous United States and Alaska, Hawaii, and Porto Rico is "domestic," and is not included in the foreign trade statistics of this country, so that it is often necessary to add it to the foreign trade to arrive at results applicable to contiguous United States alone. This has been done in this study for Hawaii and Porto Rico and for shipments of fish from Alaska. The procedure is stated with particularity, but no mention is made of the subtraction of the foreign trade of the customs districts of Hawaii and Porto Rico from the foreign trade of the United States. The omission of this step, although it was technically required, is of no perceptible consequence.

From the foregoing description one should not form the impression that this study is mostly a matter of statistical mechanics. The fact is quite the reverse. Deductions from the gross product were often puzzling and made without tangible factors. In the case of a crop, for instance, these possible items of deduction had to be considered: (a) seed for next crop; (b) "loss from failure to harvest, and incomplete harvesting, frost damage, and other factors, lowering, in the field, the total net production"; (c) nutritional loss from plant diseases and weather injury which do not affect the quantity harvested; (d) loss from vermin (rats, etc.) and other causes in storage and transportation, including decay and spoilage of perishables; (e) manufacturing losses; (f) diversion to industrial, non-food uses. "Having made the best estimates possible of such general deductions, Atwater and Bryant's nutritive factors are applied to the residue remaining." These factors involve allowance for refuse in preparing food "as purchased" for eating.

The author is now prepared to "calculate with accuracy the total national food bill." As calculated for the six years 1911–12 to 1916–17, the average yearly consumption of protein in the United States was 3,654,572 metric tons, of fat 5,115,279 tons, and of carbohydrate 16,413,087 tons, and the total calories of these three nutrients is 129,931,314,000.

At this point an obvious difficulty arises. A statistical process may seem correct in the abstract, and yet fail to function satisfactorily. The reader, having followed the author's difficult path to this point, encounters an average that is comparable with one of similar character that has previously been established in nutritional laboratory work, namely, the nutritional requirements of the adult man per day. The work in hand does not give the reader the nutritional laboratory averages. Its own average for the seven years 1911–12 to 1917–18 is 4,288 calories, the entire population having been reduced to the equivalent number of persons of this standard unit; but this average is so absurdly high that the need of a reduction factor is evident. "In calculating the nutrients in earlier chapters, use has been made of factors which allowed for inedible refuse, so that all of the inedible portions of the foods as produced or imported have already been deducted in the calculations up to this point. However, it is obvious that there is still a considerable amount of loss or wastage of strictly edible material, which might be saved and consumed under a theoretically ideal system of preparing food for the table plus a conscientious ingestion of every bit of edible material. There is a considerable loss of nutrient values in the process of cooking as ordinarily practiced. . . . Another important factor is that of edible waste in garbage. . . . The figures here presented are really statements of consumption plus edible waste and should be so regarded."

The computed average "consumption" of protein per day per adult man for the six years 1911–12 to 1916–17 is 121 grams; of fat, 169 grams; of carbohydrate, 542 grams; of the three nutrients, 4,290 calories.

Without giving any facts with regard to percentages of reduction to be applied to his computed numbers of consumption to eliminate this edible waste, the author states that "it seems probable that of the protein in human foods left in the country for consumption, in the statistical sense, it seems safe to say that 5 per cent is lost in edible wastage; of the fat, . . at least 25 per cent . . . ; of the carbohydrates, probably 20 per cent." After these reductions are made, the average eaten food per adult man per day becomes 114 grams for protein, 127 grams for fat, 433 grams for carbohydrate, and for the three, 3,424 calories. The fat average is regarded as still too high. The author is reconciled to the inclusion of this waste in totals, averages, and ratios by the reflection that, after all, the population actually "uses up" the indicated amounts of nutrients. This is shifting the point of view from that of physiological nutritional requirements, which has apparently been the purpose of the study, to that of a production that must be large enough to secure them for eating. The author's concession is sensible, since the study has been unable to establish the population's requirements of eaten nutrients. But the logic of the concession cannot stop here. If practically this waste must be suffered, so must consumption by rats, spoilage by weather, the retention of seed for the next crop, and perhaps the consumption by domestic animals.

Every one who has worked at production statistics knows how difficult of establishment Dr. Pearl must have found many items, especially in times of hurry. Estimates which seem acceptable in the present may be weakened as they recede into the past. This to some extent is true of the work in hand. Production estimates for 1917 taken from the *Monthly Crop Reporter* for December, 1917, were subsequently revised. The Food Administration's estimate of the wheat crop of 1917 was used. There is apparent disagreement of considerable degree between some items of fat and oil production in this work and the figures of *Bulletin* 769 of the Department of Agriculture, one of whose authors was chief of the Fats and Oils Division of the Food Administration. Some crops are reduced by a precise fraction on account of waste, or seed and waste, and the application of this fraction to the remainder should produce a number in agreement with the crop estimate that should be used; but, as far as tested, agreement has not been found, although the difference is usually small.

An error of some moment is found in the adopted estimates of meat production made by the Food Administration. If these estimates ever were accepted by meat statisticians outside of that office, they are not accepted now. The estimate of dressed weight of meat production for 1914–15 to 1916–17 is about 10 per cent too high, and for 1917–18 about 2 per cent too high. If the subject of edible offal had been treated, as was possible, by including the fat for making the oil that was used in making oleomargarine, and the exported oleo oil, those two food items need not have appeared in tables of secondary food production. The percentage that the edible offal is of dressed weight, already published in *Bulletin* 55 of the Bureau of Crop Estimates, should have been used, or some modification of it. For the use of that bulletin, one of the large slaughtering companies of Chicago weighed the separate edible-offal parts of over 10,000 meat animals.

This book was published in 1920 and it is regrettable that the imperfection of the hurried war work could not have been corrected in the meantime. This, however, would not have cured the greatest fundamental defect, and that is the liberty given to the statistician to create facts out of his mind. This he has constantly done in reducing production to human food production and in eliminating waste, not only from production but from the kitchen and the table.

Lest failure to mention may imply acceptance by default, objection should be made to the author's statement concerning the per capita food production. The ratio between food production and population is not the ultimate one, but it is food production per acre per capita. This comparison by no means sustains Dr. Pearl's rejoicing based on increased mere per capita production.

All are proud to acclaim the Food Administration and to regard it as one of the great successes of the war outside of army and navy operations. Yet encomiums may be misplaced, as to some small extent they are in this book. It seems not to be known that, notwithstanding meatless days and constant urgings to reduce meat consumption, the per capita consumption of meat in this country in the second year of the war (calendar, 1918) was higher than it had been for nearly a decade. But the Food Administration did not cause the orgy of meat consumption, any more than it caused the orgy of the buying of silks and shoes at $16 a pair. In wheat consumption, also, the per capita ratio kept up remarkably, in view of the restrictions and injunctions that wheat should be saved for the Allies. By dint of self denial on the part of some classes of citizens, the people as a whole managed to save per capita per week in 1917–18 less than one loaf of bread for Western Europe, but these citizens could not prevent an increased per capita consumption in 1918–19 over that of the preceding year.

A reviewer's bark may be worse than his bite, and certainly there is no biting to be done in this case. It is one of the saving graces of statistics that totals may be wrong, perhaps very wrong, and yet permit percentages and averages that are indicative of the approximate truth. It may well be the fact, as this book discovers, that, of the total energy value of the foods produced in the United States, the grains contribute 42 per cent, the meats 24½ per cent, the dairy products about 15 per cent, vegetables only 5 per cent, sugars less than 5 per cent, oils and nuts less than 5 per cent, poultry and eggs hardly 2 per cent, fruits less than 2 per cent, and fish about ⅓ of 1 per cent. This book abounds in opportunities for such interesting and important comparisons as this one, and the author has developed them with many illuminating results.

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